**CHAPTER TWO**

**LITERATURE REVIEWS**

This chapter deals with the review of literature considered important to this study. The literature review is discussed under the following sub-headings:

**2.1 Conceptual Framework**

The conceptual framework serves as a structured approach to for understanding the impact of technology in education, particularly within senior secondary schools in Edo South Senatorial District. This framework integrates several key components:

**Technological Resources and Infrastructure**

The availability, accessibility, and quality of technological resources and infrastructure form the foundational basis for technology integration in education. These resources include hardware tools (such as computers, projectors, and tablets), connectivity infrastructure (internet access, power supply), and software applications (educational platforms, digital learning environments, and multimedia resources). Literature consistently emphasizes that the presence and quality of these resources significantly determine the success or failure of technology-enhanced learning environments (Tinio, 2002).

Warschauer (2004) highlights that disparities in access to digital infrastructure often reflect broader socio-economic inequalities. According to his analysis, students from marginalized or under-resourced communities are less likely to have access to modern technological tools, thereby deepening the educational divide. This issue is particularly evident in countries like Nigeria, where urban schools often have better access to ICT resources compared to rural or semi-urban schools.

Similarly, Ojo and Abimbola (2017) found that infrastructure plays a critical role in determining the extent to which digital tools are utilized in schools. Their study revealed that schools with better facilities consistent electricity, updated computer labs, and internet connectivity reported higher levels of technology integration and student engagement. This reinforces the notion that infrastructure is not merely a supportive element but a core component of any effective technology integration strategy.

Reiser and Dempsey (2017) added that infrastructural readiness also involves having the appropriate technical support systems in place. Schools that invest in ICT personnel, routine maintenance, and technical assistance for teachers tend to have smoother and more consistent technology usage in classrooms. Without such systems, even well-funded initiatives may falter due to practical implementation problems.

According to Norris (2001), bridging the digital divide involves more than providing physical access; it also includes developing the digital capacity of schools and communities to support learning. Access without support often results in underuse or ineffective use of technologies. Hence, the effectiveness of technological infrastructure depends not only on the availability of devices and internet but also on the presence of supportive institutional systems.

More recently, the Edo State Ministry of Education (2023) emphasized in their Annual School Census Report that over 60% of public secondary schools in the state lack adequate ICT facilities. The report noted significant disparities between private and public institutions in terms of access to functional computer laboratories, internet bandwidth, and power reliability. These infrastructural gaps directly influence the capacity of teachers and students to participate in digital learning initiatives.

Furthermore, Adeoye and Adelakun (2021) argue that the presence of functional infrastructure not only improves lesson delivery but also helps teachers to demonstrate practical applications of knowledge. A school with reliable internet access, for example, can support live webinars, virtual excursions, and real-time research. The absence of these tools widens the digital divide between public and private schools.

Taken together, the reviewed literature consistently affirms the centrality of infrastructure to the success of ICT-based education. What emerges across these studies is a shared understanding that technology cannot independently improve learning outcomes unless it is supported by a well-equipped, accessible, and sustainable infrastructural environment. The literature also reveals a concerning pattern while infrastructure is often included in policy rhetoric, its actual implementation remains insufficient, especially in public schools across developing nations.

An important insight is the dynamic relationship between infrastructure and other elements of ICT adoption such as teacher training, student engagement, and curriculum design. For instance, Reiser and Dempsey (2017) emphasize the value of technical support systems, which aligns with Ojo and Abimbola's (2017) observation that equipment alone is not enough without consistent power supply and maintenance. These connections underscore the idea that technological infrastructure is not a stand-alone component but part of a broader ecosystem of digital readiness.

In the context of Edo South Senatorial District, the synthesis of findings suggests that without urgent investment in infrastructure, efforts to promote digital literacy and classroom technology use will remain largely ineffective. Schools with poor ICT infrastructure are unlikely to attract or retain skilled teachers, and students in such environments will continue to be disadvantaged in comparison to their peers in better-resourced institutions. Hence, addressing infrastructural limitations is not just a technical requirement but a social equity imperative.

In conclusion, the literature highlights that technological infrastructure is central to the successful integration of ICT in education. Schools in developing regions, particularly in Nigeria, face persistent infrastructural barriers that undermine the benefits of digital learning. Therefore, any educational reform aimed at leveraging technology must prioritize investments in infrastructure, ensure equitable distribution, and incorporate continuous support mechanisms to enable meaningful access and use.

**Teacher Preparedness and Professional Development**

Teacher preparedness refers to the extent to which teachers possess the knowledge, skills, and attitudes necessary to integrate technology into teaching. The preparedness of teachers and their attitudes toward technology are pivotal in determining the successful integration of digital tools into educational settings. Technological infrastructure alone cannot transform education if teachers lack the skills, confidence, or motivation to use it. According to Ertmer et al. (2012), teacher beliefs about technology particularly their perceived ease of use and its relevance to teaching heavily influence how and whether it is implemented in classrooms.

Bandura’s (1977) theory of self-efficacy provides a useful lens for understanding teacher behavior. When teachers believe in their ability to effectively use technology, they are more likely to experiment with new tools and integrate them meaningfully into instruction. Conversely, low self-efficacy, even in the presence of available resources, often leads to avoidance or minimal use of ICT in classrooms.

In a study by Emenike and Osarenren (2018), many Nigerian teachers reported that they felt unprepared to integrate ICT into their teaching due to a lack of formal training. The study also found that access to professional development significantly influenced the teachers’ confidence and willingness to adopt technology. Teachers who received consistent training were more likely to demonstrate innovative uses of ICT in lesson planning and delivery.

Adewale and Alabi (2019) emphasized that continuous teacher training must be a cornerstone of any technology integration strategy. Their study revealed that without structured and practical training, most teachers default to traditional chalk-and-board methods, even when digital resources are available. This finding supports the argument that professional development should be ongoing, context-specific, and hands-on.

Koehler and Mishra’s (2009) TPACK framework highlights that teachers need a mix of technology skills, teaching methods, and subject knowledge to use digital tools effectively. Simply knowing how to operate a computer isn’t enough—they also need to understand how to use technology to support what they are teaching. In Edo South, the Ministry of Education organizes training workshops, but many teachers say these sessions are either too brief or focus too much on theory rather than practical use.

Davis’s (1989) Technology Acceptance Model (TAM) reinforces these findings. According to the model, users' acceptance of technology is determined by their perceptions of its usefulness and ease of use. For teachers, this means that if they believe technology will enhance student learning and that it is not too complex to use, they are more likely to adopt it. Therefore, effective teacher preparation must not only develop digital competencies but also reshape attitudes.

In addition, institutional culture and leadership support play a significant role in shaping teacher attitudes. Studies have shown that schools with collaborative cultures and supportive administrators tend to have higher rates of ICT adoption (Koehler & Mishra, 2009). When teachers feel encouraged and supported, their confidence grows, and resistance to change diminishes.

Ajayi (2017) looked into the difficulties rural school teachers face when trying to use technology. He discovered that the main challenges included the absence of support from fellow teachers, little help from school leaders, and not having enough time. To be effective, teacher training needs to be ongoing, hands-on, and flexible enough to match different skill levels.

School environment also affects how teachers grow. According to Ojo and Abimbola (2017), schools where teachers work together as a team are more likely to successfully use and keep using digital teaching methods. Support from colleagues and school leaders can encourage teachers who are unsure about technology to try out new tools and techniques.

The literature clearly demonstrates that teacher preparedness and attitudes are both psychological and practical in nature. A common thread across studies is the importance of training not just once, but continuously to ensure that educators stay abreast of new technologies and pedagogical strategies. While resources and policy matter, the personal beliefs and professional readiness of teachers often determine the real-world impact of technology in classrooms.

This component of the conceptual framework also interacts significantly with other factors like infrastructure and student engagement. For example, even in schools where infrastructure is adequate, the lack of trained and motivated teachers often results in poor utilization of digital tools. This emphasizes that technology integration is a human-centered process that depends heavily on teachers’ capacity and mindset.

In the context of Edo South Senatorial District, where many teachers may not have had consistent access to professional development, the implications are profound. Building a digitally empowered teaching workforce is essential for any meaningful advancement in educational outcomes. Training programs should not only address technical skills but also foster positive attitudes by demonstrating tangible benefits in classroom effectiveness.

**Student Engagement and Learning Outcomes**

Student engagement refers to the level of attention, interest, curiosity, and motivation students show in the learning process. When students are actively engaged, they are more likely to understand and retain content. Student engagement and academic achievement are widely acknowledged as key indicators of the success of educational interventions, including the integration of technology in classrooms. Numerous studies emphasize that when digital tools are meaningfully applied, they can significantly enhance student motivation, interactivity, and comprehension (Schlechty, 2011).

Engaging students requires creating meaningful learning experiences. Digital games, quizzes, simulations, and virtual reality environments encourage active rather than passive learning. Adesanya and Idowu (2016) observed that students taught with interactive videos and educational apps performed better and were more attentive. Their study in Lagos State showed a 30% improvement in test scores after tech-based instruction.

According to Kirkwood and Price (2014), the success of technology in driving engagement depends on how it's used. Poorly designed tools or inconsistent use can reduce interest and even cause distraction. Thus, student-centered technology must be intuitive, visually appealing, and curriculum-aligned.

Furthermore, Musa and Ibrahim (2020) found that students are more engaged when they feel ownership of their learning. Platforms like Google Classroom and Moodle allow students to review materials, submit assignments, and get feedback at their own pace. This fosters autonomy and deeper learning. In schools where such systems are available, students reported greater satisfaction and lower dropout intentions.

According to Adewale and Alabi (2019), technology offers students diverse avenues for learning such as multimedia content, simulations, and interactive apps that make learning more personalized and engaging. Their study found that students who regularly interacted with digital learning platforms performed better in standardized assessments than those taught using only traditional methods.

Obi and Okoro (2020) similarly observed that student-centered technologies, such as educational games and collaborative tools, foster improved classroom participation and higher levels of concentration. In their research in Edo South Senatorial District, they found a noticeable improvement in students’ involvement during lessons that incorporated technology, particularly in science and mathematics.

Moreover, a study by Adesanya and Idowu (2016) highlighted that technology can bridge different learning styles, supporting auditory, visual, and kinesthetic learners more effectively. This diversity in content delivery methods helps students grasp complex concepts and retain information longer.

Kirkwood and Price (2014) stressed that the nature of student engagement with technology depends on the quality of its integration. When technology is embedded thoughtfully into the curriculum, it encourages active learning, peer collaboration, and independent exploration. However, superficial or inconsistent use may yield limited results or even disengagement.

From a theoretical standpoint, constructivist learning theories support the idea that learners construct their own knowledge through interaction with tools and their environment. Technology, when used to support discovery learning, project-based tasks, and formative assessments, aligns with this theory and leads to deeper engagement (Jonassen, 1999).

While the reviewed literature agrees that technology holds substantial promise for increasing student engagement and achievement, the impact is not automatic. Rather, it depends on how and when the technology is used, and whether both students and teachers are adequately equipped to interact with it. Studies by Obi and Okoro (2020) and Adewale and Alabi (2019) affirm the positive outcomes associated with purposeful use, while Kirkwood and Price (2014) caution against assuming that the presence of digital tools alone will improve learning.

Another consistent finding is that student engagement increases when technology is used to create active, not passive, learning experiences. Interactive simulations, quizzes, and collaborative platforms generate excitement and agency among students, especially when aligned with curriculum objectives. In Edo South Senatorial District, such approaches could potentially help close achievement gaps in key subject areas.

Overall, the literature suggests that technology can significantly enhance learning outcomes if implemented with pedagogical intent, supported by teacher training, and guided by student needs. For this study, understanding the nature of student interaction with technology will be crucial in evaluating its overall impact on educational effectiveness.

**Equity and Access to Technology**

Equity and access to educational technology remain persistent challenges in both global and local contexts. Equity in education implies that all learners, regardless of socioeconomic status, geographical location, or disability, have access to quality learning resources and opportunities. However, research has repeatedly shown that unequal access to technology has led to a widening digital gap, especially in developing countries and as Warschauer (2004) emphasizes, equity goes beyond device distribution, it involves ensuring that all students can use the tools meaningfully.

Norris (2001) posits that the digital divide is not merely about physical access to hardware or internet connectivity, but about meaningful access which includes affordability, digital literacy, and the ability to use digital tools effectively for educational advancement. In his global analysis, he found that socioeconomically disadvantaged students are not only less likely to have access to computers and internet but also receive limited guidance on how to use them productively.

In the Nigerian context, Tinio (2002) underscores that digital equity is further undermined by regional disparities, inconsistent funding, and infrastructural limitations. Urban schools are generally better equipped, while schools in rural or semi-urban settings often lack the most basic technological infrastructure. This unequal distribution directly affects students’ learning opportunities and future competitiveness in a digital economy.

Obi and Okoro (2020), in their study of Edo South Senatorial District, found stark contrasts in technology access between public and private schools. While some private institutions had access to smartboards, internet-enabled classrooms, and project-based digital learning, most public schools were limited to a few outdated desktop computers, often shared by many students. This not only restricts learning but perpetuates educational inequalities.

Reiser and Dempsey (2017) add that access must also be inclusive of students with disabilities. Their work highlights the importance of adaptive technologies such as screen readers and voice recognition software in ensuring that all learners can benefit from digital resources. However, such inclusive technologies are rarely prioritized in low-resource settings.

Emenike and Osarenren (2018) emphasize that fair access to technology also relies on making sure educational content fits the local culture and language. If learning materials don’t reflect students’ real-life situations or are not in a language they understand, the technology might not be useful or fully used. They also suggest that government policies should focus more on supporting disadvantaged communities when rolling out digital education. Programs like the Universal Service Provision Fund (USPF) and other grants can help provide resources to schools that lack proper funding.

The literature reviewed reveals that equitable access to educational technology is multifaceted. It extends beyond the mere presence of devices to include training, support systems, localized content, and affordability. There is also a need to move from access to meaningful use. Warschauer (2004) and Norris (2001) advocate that policymakers must view access as a layered concept physical, digital, educational, and cultural.

Community involvement enhances equity. Schools that engage local leaders, parents, and alumni in fundraising or donations tend to bridge the gap faster. Equitable access requires systemic commitment, community support, and continuous evaluation to ensure that no student is left behind in the digital learning revolution.

In the case of Edo South Senatorial District, the synthesis suggests that although some schools are progressing with technology integration, many are still far behind. These gaps are compounded by socioeconomic inequalities, lack of government intervention, and inconsistent community support. Without targeted investments and inclusive policies, technology may end up amplifying rather than narrowing the education gap.

Thus, any strategy to enhance digital learning in the region must prioritize equitable access. This includes not only expanding ICT infrastructure but also ensuring that all students and teachers regardless of background have the knowledge, tools, and support needed to use it effectively.

The conceptual framework for this study highlights the interconnected nature of various factors that influence the successful integration of technology in education. One of the key elements is infrastructure, which includes both physical resources like computers and internet access, and soft infrastructure such as technical support and digital literacy programs. Without a strong infrastructure, other efforts to integrate technology may falter. For example, teachers may be well-trained and eager to use digital tools in their classrooms, but if the internet is unreliable or computers are outdated, their efforts will be hampered.

The interplay between these components is critical. For instance, the presence of technological resources alone does not guarantee improved educational outcomes; it must be complemented by teacher preparedness and a conducive learning environment. This framework underscores the multifaceted nature of technology integration in education, where each element must align to maximize benefits.

**2.2 Theoretical Framework**

This study is guided by a combination of established educational and behavioral theories that explain how technology adoption and integration affect teaching and learning outcomes. These theories provide a conceptual basis for understanding the variables explored in this research and serve to connect the study to existing knowledge in the field.

Bandura's Social Learning Theory emphasizes that learning occurs in a social context and is facilitated through observation, imitation, and modeling. In technology-supported classrooms, students are not limited to learning from teachers alone. They observe peers using digital tools, engage in collaborative activities via platforms such as Google Classroom or Zoom, and mimic problem-solving techniques demonstrated through videos and simulations. Technology thus serves as both a medium for social interaction and a tool for observational learning.

In the Nigerian classroom context, especially in schools within Edo South Senatorial District, peer modeling and observational learning are crucial in encouraging students to adopt positive learning behaviors. For example, students unfamiliar with educational apps or digital platforms are more likely to explore these resources after seeing their peers successfully engage with them. Therefore, the application of Social Learning Theory explains how technology in the classroom enhances social and cognitive development.

The Technology Acceptance Model (TAM) focuses on two major constructs—perceived usefulness and perceived ease of use—that influence individuals' intention to use a new technology. Teachers are more inclined to incorporate technology into their teaching if they perceive that it will make their work more effective or more efficient. Conversely, if a digital tool is seen as too complicated or irrelevant to the curriculum, resistance to its use increases.

In the context of this study, TAM helps to frame the investigation into teachers’ preparedness and attitudes. For example, even in schools with adequate ICT resources, technology integration might remain low due to negative perceptions or a lack of training. Understanding these attitudinal barriers is crucial in designing effective training programs that focus not only on technical skills but also on demonstrating educational value.

Constructivist theorists like Jean Piaget and Lev Vygotsky argue that learners actively construct their own understanding through experiences, inquiry, and problem-solving. When technology is integrated into the classroom in ways that promote hands-on learning, students are better able to engage in discovery-based learning processes. Tools such as educational games, simulations, and interactive e-textbooks encourage learners to explore, ask questions, and construct their own knowledge.

Vygotsky’s concept of the Zone of Proximal Development (ZPD) also fits well with digital learning environments. For instance, scaffolded digital resources like video tutorials or step-by-step coding platforms can support learners in mastering concepts that might be difficult with traditional instruction alone. In the context of this study, constructivist theory helps explain how technology facilitates differentiated learning experiences and enhances student engagement.

The TPACK framework represents the intersection of three primary forms of teacher knowledge: Content Knowledge (CK), Pedagogical Knowledge (PK), and Technological Knowledge (TK). The model asserts that effective integration of technology in education does not depend solely on knowing how to use a tool but understanding how, when, and why it should be used in conjunction with content and pedagogy.

TPACK is especially relevant in the Nigerian educational landscape, where teachers often receive fragmented or insufficient ICT training. A teacher might know how to operate a digital whiteboard but not how to use it to teach chemistry effectively. The TPACK framework underscores the need for integrated professional development programs that simultaneously address content mastery, pedagogical techniques, and digital fluency.

Rogers’ Diffusion of Innovations Theory outlines how new ideas and technologies spread within a social system. It identifies key elements that influence adoption: relative advantage, compatibility, complexity, trialability, and observability. In the case of schools, factors such as school leadership, peer influence, and visibility of successful outcomes play major roles in how quickly and effectively technology is adopted.

This theory provides a valuable framework for interpreting the differences in technology use between public and private schools, or between urban and rural areas. Schools that demonstrate clear benefits of technology integration (e.g., improved student performance or administrative efficiency) are more likely to influence others to follow suit. Understanding these diffusion patterns helps stakeholders develop better strategies for encouraging widespread adoption of educational technology.

Cognitive Load Theory suggests that students have a limited capacity in their working memory. If too much information is presented at once, especially in a confusing or disorganized way, students may struggle to learn. Technology can help manage this by breaking content into smaller parts, using visual and audio aids, and allowing students to learn at their own pace.

For example, a video lesson that explains a science topic with diagrams and animations can reduce cognitive strain compared to a long-written passage. In this way, Cognitive Load Theory supports the idea that when technology is used wisely, it makes learning more efficient and less overwhelming.

The SAMR model describes four levels of technology use in education: Substitution, Augmentation, Modification, and Redefinition. At the Substitution level, technology simply replaces traditional tools (e.g., typing instead of handwriting). At Redefinition, however, technology enables new tasks that were previously impossible (e.g., students collaborating with peers from other countries via virtual exchanges).

This model helps assess how deeply technology is integrated in schools. It encourages educators to aim for higher levels of transformation rather than just using tech for convenience. In Edo South, the SAMR model can be used to evaluate how schools use digital tools not just whether they are used, but how meaningfully.

Kolb’s Experiential Learning Theory argues that real learning happens through experience by doing, reflecting, thinking, and then applying. Technology supports this cycle by offering simulations, virtual labs, interactive experiments, and project-based learning.

In schools with limited physical resources, digital labs or software can give students virtual hands-on experiences. This theory reinforces how technology brings learning to life, making lessons more practical and connected to real-world contexts.

B. F. Skinner’s Behaviorist Theory (1953), though developed many years ago, still applies in modern digital classrooms. It plays a role in systems that use feedback, rewards, and repeated practice to guide learning. Today, many learning platforms and educational apps apply these ideas by using rewards like badges, points, or progress bars to encourage students and keep them motivated.

Lave and Wenger’s Situated Learning Theory emphasizes that students grasp knowledge more effectively when they are involved in meaningful, real-life activities. In today’s digital era, technology makes this possible by simulating authentic learning environments. For example, virtual reality (VR) can transport learners to historical landmarks, or allow them to carry out science experiments in a virtual lab. These immersive experiences give students a richer, more practical understanding of what they’re studying bridging the gap between theory and real-world application.

Deci and Ryan’s Self-Determination Theory highlights the importance of three core elements in learning: autonomy, competence, and connection. Technology supports these drivers by allowing students to choose tools and platforms that align with their interests, and by providing timely feedback that builds their confidence. For instance, apps that let students work at their own pace or explore topics they’re passionate about can significantly increase intrinsic motivation. This theory underpins the growing trend toward personalized digital learning paths, where students feel empowered, capable, and more engaged.

Richard Mayer’s Cognitive Theory of Multimedia Learning argues that students learn best when information is presented through both visuals and words, rather than text alone. In classrooms where learners might struggle with reading or where multiple languages are spoken, this theory becomes especially useful. Educational videos, animated lessons, and interactive infographics help simplify complex concepts and improve retention. By aligning digital content with how the brain processes information, this approach makes learning more accessible and memorable for all students.

Connectivism is a modern learning theory for the digital age. It says that learning happens through networks connections with people, information sources, and digital tools. This is especially true today, where students learn from online forums, social media, search engines, and digital communities.

Connectivism shows why it’s important for students to not just memorize facts but know how to find, filter, and use information. In technology-rich environments, this theory explains the shift from teacher-centered to learner-driven education.

Though older, behaviorist theory still applies to many modern learning tools. It’s based on the idea that learning is shaped by reinforcement rewards or punishments. Many educational apps and online platforms use this idea by giving instant feedback, badges, or scores to motivate students.

In Nigerian schools, especially in settings where student motivation is a challenge, gamification tools grounded in behaviorist principles can keep learners engaged and progressing.

Each of these theories contributes to a deeper understanding of how and why technology influences education. Some, like Constructivism and Experiential Learning, focus on how students learn. Others, like TAM and Diffusion of Innovations, focus on how teachers and schools adopt new tools. TPACK helps bridge the gap between knowledge and classroom practice, while models like SAMR and Connectivism show how technology changes what learning looks like.

In this study, these theories provide both the justification for the research problem and a framework for interpreting findings. They emphasize that meaningful technology use depends on infrastructure, training, beliefs, student needs, and innovation. This theoretical foundation ensures that the research is anchored in well-established knowledge and can contribute to both practice and further inquiry.

**2.3 Empirical Studies**

Several studies both local and international have been conducted to examine the role of technology in enhancing teaching and learning across different educational levels. This section presents a synthesis of empirical evidence gathered from relevant scholarly works, particularly those focused on Nigeria and similar educational settings, to establish what is already known, where gaps exist, and how this present study contributes to the discourse.

In a seminal study conducted by Adewale and Alabi (2019), the researchers evaluated the impact of technology integration on students’ academic performance in Nigerian secondary schools. The study utilized a sample of 300 students selected through stratified random sampling across 10 schools. Using both test scores and structured questionnaires, the researchers found that students who regularly accessed digital learning tools especially educational software and the internet demonstrated superior academic performance, particularly in science and mathematics. Their findings underscore the importance of access to technology and its correlation with improved cognitive engagement and academic achievement. Notably, the study stressed that technology alone is not enough; it must be accompanied by teacher supervision and curriculum alignment for effective outcomes.

Another empirical study by Obi and Okoro (2020) focused on barriers to technology integration in Nigerian secondary schools. Their mixed-methods approach combined interviews with school administrators and surveys distributed to over 250 teachers and students across both public and private institutions. The study revealed stark disparities in access to ICT infrastructure. While private schools had functional computer labs and stable electricity, most public schools had outdated or non-functional systems, if any. The researchers emphasized that the lack of maintenance culture and insufficient government funding were primary contributors to this divide. Importantly, the study found that even where basic technology existed, lack of teacher training led to underutilization, highlighting a dual-layered barrier: access and competence. They recommended an increased budgetary allocation for ICT and regular teacher development initiatives.

A study by Emenike and Osarenren (2018) sought to assess the role of professional development in enhancing the use of technology in Nigerian classrooms. They conducted a quasi-experimental study involving 120 teachers who participated in a structured ICT training program over six weeks. Pre- and post-tests showed a significant improvement in the teachers’ confidence and competence levels in using digital tools. Additionally, classroom observations revealed that trained teachers were more likely to incorporate multimedia and online content into their lessons. The study concluded that ongoing, context-specific training is a critical driver of effective technology use and should be institutionalized as part of teacher development programs. It also stressed the importance of mentorship and follow-up support post-training.

Further evidence is provided by Ojo and Abimbola (2017), who studied the relationship between infrastructural investment and technology usage in secondary schools across Southern Nigeria. The study involved surveys from 450 respondents, including students, teachers, and IT personnel. Their findings highlighted a strong positive relationship between the quality of infrastructure (internet connectivity, functional hardware, and power supply) and the frequency of technology use in classrooms. They also noted that in schools where principals actively supported digital adoption by encouraging ICT clubs or assigning tech-savvy teachers to lead training there was significantly higher use of educational technology tools. This finding supports the argument that school leadership is a key determinant in successful integration.

In a more focused study on student engagement, Adesanya and Idowu (2016) examined the effect of technology-enhanced learning on science students in Lagos State. Using a comparative design, the researchers observed two groups: one taught using conventional methods and the other using a technology-enriched approach involving simulations, interactive videos, and mobile learning apps. The tech-enhanced group demonstrated higher motivation, improved test scores, and better retention of content. The study emphasized the role of interactive technologies in fostering curiosity and independent learning, especially in subjects perceived as difficult. Additionally, students expressed more enthusiasm about learning when digital tools were integrated into the teaching process.

An important empirical study by Ogundele and Olaleye (2021) examined the impact of mobile learning on academic achievement among secondary school students in Oyo State. The researchers used a sample of 200 students divided into control and experimental groups. The experimental group used mobile apps such as Google Classroom and Quizlet for a period of 6 weeks. At the end of the study, the students in the mobile learning group showed significant improvement in English Language and Mathematics compared to the control group. The study concluded that mobile devices can serve as powerful educational tools when guided appropriately.

Equally significant is the work of Ahmed and Adebayo (2020), who explored how socio-economic background influences students’ access and use of digital resources in Northern Nigeria. They used structured interviews and surveys involving 400 students across low-income and high-income communities. Their analysis showed that students from wealthier backgrounds had more access to home internet and personal devices, while those from poorer communities relied entirely on school facilities. The study underlined the urgent need for equity-driven policies that bridge the digital divide.

In a different but related context, Musa and Ibrahim (2020) investigated the attitudes of teachers towards integrating technology in classrooms in the Federal Capital Territory, Abuja. Their study, which included responses from 150 teachers, found that most teachers acknowledged the usefulness of technology but expressed hesitation due to lack of training and fear of failure. The findings suggest that while attitudinal readiness exists, structural barriers need to be addressed through systemic support and confidence-building workshops.

Another valuable study by Chukwu and Anozie (2022) focused on the relationship between ICT policy implementation and classroom practices in Enugu State. Through document analysis and interviews with policymakers and school administrators, they found a significant gap between national ICT policy intentions and actual practices in schools. Schools lacked clear frameworks, and teachers often were unaware of existing policies. The study suggested a stronger alignment between policy and practice through stakeholder engagement and periodic evaluation.

The study by Umeh and Eze (2021) explored how gender affects the use of technology among secondary school students in Anambra State. The study revealed that male students were more likely to experiment with new technologies, while female students showed higher interest in using tech tools for collaborative learning. These gender differences highlighted the need for inclusive training approaches that cater to diverse preferences and encourage participation across groups.

Another important empirical investigation was carried out by Okonkwo and Udo (2018), who examined the relationship between technology use and teacher productivity in South-East Nigeria. The researchers administered structured questionnaires to 180 secondary school teachers. The study revealed a strong positive correlation between ICT use and various dimensions of productivity, including timely lesson planning, more effective student feedback, and overall job satisfaction. Teachers who regularly used digital tools such as PowerPoint, grading software, and lesson planners reported feeling more in control of their workload. This study underscores the broader benefits of technology for teacher efficiency, not just student outcomes.

In a rural-focused study, Ibrahim and Bello (2019) explored the challenges facing e-learning implementation in underserved areas of Northern Nigeria. Using qualitative interviews with 50 teachers and administrators, the study uncovered recurring issues such as lack of electricity, inadequate digital literacy, poor infrastructure, and limited internet access. Many participants expressed frustration with inconsistent government support and a lack of technical personnel to manage school ICT resources. These findings echo challenges also observed in parts of Edo South Senatorial District, reaffirming the need for systemic solutions beyond hardware provision.

Nkwocha and Ekeh (2020) conducted a quasi-experimental study on the effectiveness of interactive whiteboards on student retention in senior secondary schools in Imo State. Their research involved 250 students, divided into experimental and control groups. The students exposed to interactive whiteboards consistently outperformed their peers in both short-term tests and long-term retention assessments. The study concluded that interactive visual tools help students retain complex information better than traditional teaching aids. The implications of this study suggest that investment in smart classrooms can yield measurable improvements in student learning.

In a broader look at student preparedness, Fatoba and Adeleke (2022) assessed digital readiness among secondary school students in Lagos State. Their sample included 500 students from urban, suburban, and rural schools. The findings showed that students in urban schools had higher digital literacy and greater access to personal devices and the internet. Students from rural schools, on the other hand, relied heavily on school-owned devices, which were often shared and outdated. This study reinforces the digital divide along socioeconomic and geographic lines, aligning with findings from other regions and emphasizing the need for equity-focused interventions.

Finally, Afolabi et al. (2023) evaluated the effect of Learning Management Systems (LMS) like Moodle on assignment completion and student satisfaction. Conducted in three private secondary schools over one academic term, the study showed that assignment submission rates increased from 58% to 88% after the introduction of LMS tools. Furthermore, students reported greater clarity in task expectations, improved feedback from teachers, and enhanced engagement with course content. The study demonstrates the administrative and pedagogical potential of digital platforms to improve learning outcomes.

Although these studies offer valuable information, many tend to concentrate on just one area such as infrastructure, teacher training, or access to technology, or they present broad conclusions without focusing on less-studied areas like Edo South Senatorial District. This shows a clear need for more focused and detailed research that looks at all key factors access, readiness, engagement, and outcomes together. This current study aims to fill that gap by combining all these aspects into one comprehensive investigation, based on real experiences shared by students, teachers, and school administrators in the region.

In summary, the reviewed empirical studies consistently affirm that technology holds substantial potential to transform teaching and learning. However, its actual impact depends on a combination of factors: availability of infrastructure, teacher preparedness, institutional support, and student readiness. These studies not only validate the relevance of the current research but also highlight the urgent need for targeted interventions in resource-constrained environments like those found in parts of Edo South.

**2.4 Appraisal of Reviewed Literature**

The review of the existing literature on technology in education has revealed many important insights that help explain the current situation in Nigerian secondary schools, especially in Edo South Senatorial District. By examining both conceptual discussions and real-world research findings (empirical studies), this appraisal helps identify what we already know and what areas still need to be explored more deeply. It also explains how this current study will help fill those gaps.

From the conceptual studies, it is clear that the successful use of technology in education does not rely on one single factor. Instead, it depends on a group of closely related elements availability of technological resources and infrastructure, how well teachers are trained and prepared, how engaged students are, and whether there is equal access for all learners. Scholars like Warschauer (2004), Tinio (2002), and Obi & Okoro (2020) have emphasized that without basic infrastructure like electricity, internet, and computers, teachers and students cannot make use of even the best digital tools. This shows that infrastructure is not just one aspect of integration it is the foundation for all other efforts.

In terms of teacher preparedness and training, the literature reviewed stresses the need for continuous professional development. Ertmer et al. (2012) and Emenike & Osarenren (2018) have pointed out that many teachers either lack digital skills or are unsure about how to use technology effectively in the classroom. Some teachers fear making mistakes or feel that digital tools are too complex to use. This is why theories like TPACK (Koehler & Mishra, 2009) and TAM (Davis, 1989) are so important—they help explain that technology adoption depends heavily on how useful and easy teachers believe the tools are. Simply giving teachers devices is not enough. They need practical training and ongoing support.

The reviewed studies also highlight how technology can improve student learning and engagement, especially when used in interactive ways. Studies like those by Adesanya & Idowu (2016) and Kolb (1984) show that when students are exposed to digital games, simulations, and learning platforms, they tend to participate more, understand better, and enjoy the learning process. However, scholars like Kirkwood and Price (2014) warn that technology should not be used just for the sake of it poorly planned use can even reduce engagement. So, it's not about whether technology is used, but how it is used that matters most.

Another major theme that stands out is the issue of equity. Even though some schools, especially private or urban ones, are making good use of digital tools, others are being left behind due to lack of access. This digital divide is not just about having a computer. It includes internet access, learning materials, digital literacy, and language barriers. Researchers like Norris (2001), Obi & Okoro (2020), and Fatoba & Adeleke (2022) all point out that students from poor or rural backgrounds are at a disadvantage when it comes to using technology. This is a major concern because it widens educational inequalities and limits future opportunities for affected students.

When we examine the empirical studies, it becomes clear that while many Nigerian researchers have tried to assess the use of technology in schools, a lot of the findings are still general in nature. Many studies (like those by Adewale & Alabi, 2019 and Ojo & Abimbola, 2017) give a national or regional picture, but there is limited work focusing specifically on Edo South Senatorial District. Yet, we know that this region includes a mix of urban and rural areas, government and private schools, and diverse socio-economic communities. This makes it important to understand local realities rather than assuming that findings from Lagos or Abuja also apply in Benin City or Uhumwode.

Another limitation in the literature is that most studies only collect data over a short time (often one school term or less). Few studies look at the long-term effects of using technology in teaching and learning. For instance, how does technology use affect students’ learning progress over the course of an academic year? What happens to student motivation, teacher practice, or school policies after one or two years of continuous use? These are questions that remain unanswered.

Additionally, there is a lack of studies that directly capture the voices of students. While many researchers ask teachers and school heads for their views, fewer studies collect detailed information from the students themselves. But students are the ones who use these tools in learning, and their views what works for them, what challenges they face are just as important. Studies like Umeh & Eze (2021) and Afolabi et al. (2023) show that involving students can reveal insights that teachers or administrators may not notice.

In summary, the reviewed literature gives strong support for the idea that technology, when properly implemented, can improve teaching and learning. It helps teachers become more productive, allows students to participate actively in learning, and offers new ways to deliver and assess content. But the literature also shows that challenges remain, particularly in terms of infrastructure, teacher training, equitable access, and student-centered evaluation. There is also a need to focus more on local studies, longer-term tracking, and inclusion of student voices.

This current study is important because it responds directly to these gaps. By focusing on senior secondary schools in Edo South Senatorial District, it provides much-needed localized data. It also collects information from students, teachers, and administrators—offering a 360-degree view of the challenges and opportunities of technology integration. By doing so, it not only adds to academic knowledge but also provides practical guidance for policymakers, school leaders, and educators who want to use technology to improve learning outcomes.

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